

# Deep-sea Squat Lobsters of the *Munidopsis serricornis* Complex in the Indo-West Pacific, with Descriptions of Six New Species (Crustacea: Decapoda: Munidopsidae)

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**ABSTRACT.** The deep-sea squat lobster, *Munidopsis serricornis* (Lovén, 1852), originally described from the north-eastern Atlantic, has long been considered near cosmopolitan with numerous reports also from the western Pacific and northern Indian Ocean. These Indo-West Pacific records are reviewed along with new material from seamounts throughout the region. *Munidopsis serricornis* sensu stricto is restricted to the Atlantic Ocean. Six new species are described from the Indo-West Pacific: *M. alcocki* sp. nov. from the central to western Indian Ocean; *M. atlantis* sp. nov., from the Southwest Indian Ridge; *M. macphersoni* sp. nov. from the Austral Islands, French Polynesia; *M. spiridonovi* sp. nov. from the western Indian Ocean; *M. nias* sp. nov. from southern Indonesia and the Nicobar Islands; and *M. pyrochela* sp. nov. from New Zealand, Australia and the Southwest Indian Ridge.

**KEYWORDS:** Anomura, taxonomy, Subantarctic, Pacific Ocean, Indian Ocean, seamounts.

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More than 250 species of the squat lobster genus *Munidopsis* Whiteaves, 1874, are known worldwide (Baba *et al.*, 2008; Ahyong *et al.*, 2011). Most species are regionally restricted, occurring either in the Indo-West Pacific or Atlantic-East Pacific, but seldom in both regions. Among the few *Munidopsis* species currently believed cosmopolitan or near cosmopolitan, *M. serricornis* (Lovén, 1852) has been reported from the eastern and western Atlantic Ocean, Indian Ocean, south-western Pacific Ocean and South China Sea (Baba *et al.*, 2008). Morphological heterogeneity between Atlantic, Pacific and Indian Ocean populations, however, suggests that published records of *M. serricornis* are based on several species (e.g., Baba, 1988; Baba & Poore, 2002; Ahyong & Poore, 2004; Macpherson, 2007; Osawa *et al.*, 2008).

The name *Munidopsis serricornis*, and its synonyms, *M. rosacea* (A. Milne-Edwards, 1881) and *M. tridentata* (Esmark, 1857), has been widely applied to forms sharing the combination of a broad, flat, distally trifid rostrum, unarmed eyestalks, distinct outer orbital spines, pereopods without epipods, unarmed abdominal tergites and an unarmed dorsal carapace surface (apart from sometimes a pair of epigastric spines). Some records of *M. serricornis* from Australia and New Zealand have already been identified as other species, such as *M. treis* Ahyong & Poore, 2004 (type locality: Great Australian Bight) and *M. comarge* Taylor, Ahyong & Andreakis, 2010 (type locality: off Albany, Western Australia). Additionally, new *serricornis*-complex species continue to be discovered, such as, *M. pubescens*

Macpherson, 2007 (type locality: Madagascar), and *M. ternaria* Macpherson, 2007 (type locality: New Caledonia). *Munidopsis serricornis* sensu stricto, together with other close relatives worldwide, form the *serricornis* complex. As part of a review of the *serricornis* complex, the present study analyses new seamount material from Indo-West Pacific localities and reassesses previous records of *M. serricornis* from the region. *Munidopsis serricornis* sensu stricto is restricted to the Atlantic Ocean and six new *serricornis*-complex species from the Indo-West Pacific are described.

## Materials and methods

Morphological terminology generally follows Baba *et al.* (2009) and Baba *et al.* (2011). Carapace length (cl) is measured along the dorsal midline and includes the rostrum. Postorbital carapace length (pcl) is measured from the posterior margin of the orbit to the midposterior margin of the carapace. Specimens examined are deposited in the collections of the Australian Museum, Sydney (AM); Muséum national d'Histoire naturelle, Paris (MNHN); Museum Victoria, Melbourne (NMV); Zoological Museum, Moscow State University, Moscow (ZMM); National Institute of Water and Atmospheric Research, Wellington (NIWA); Oxford University Museum of Natural History (OUMNH); National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM); the Zoologische Museum Berlin (ZMB); and the Zoological Museum, University of Copenhagen, Denmark (ZMUC). The distribution map was produced with the aid of PanMap version 0.9.6 ([www.pangaea.de/software/PanMap/](http://www.pangaea.de/software/PanMap/)).

## Systematics

### *Munidopsidae* Ortmann, 1898

#### *Munidopsis* Whiteaves, 1874

#### *Munidopsis alcocki* sp. nov.

Figs 1, 9

*Munidopsis rosacea*.—Alcock & Anderson, 1899a: 4, 19.  
*Munidopsis rosacea*.—Alcock & Anderson, 1899b: pl. 40;

fig. 4 [Not *M. rosacea* (A. Milne-Edwards, 1881) = *M. serricornis* (Lövén, 1852)].

*Munidopsis (Galathodes) tridentata*.—Alcock, 1901: 264–265. [Not *M. tridentata* Esmark, 1857].

*Munidopsis serricornis*.—Ahyong & Poore, 2004: 57 [Bay of Bengal specimens only]; Macpherson, 2007: 97.

**Type material.** HOLOTYPE: AM P2701 (ex Indian Museum 783/10), male (cl 13.6 mm, pcl 10.1 mm), Bay of Bengal, off Ceylon [Sri Lanka], 8°44'40"N 81°20'15"E, 296–320 fathoms [542–586 m], green mud, RIMSS *Investigator* Stn 201, 16 April 1895. PARATYPES: AM P87579 (ex Indian Museum 783/10), 1 female (cl 12.2 mm, pcl 9.0 mm), collected with holotype; ZMUC CRU10114, 1 male (cl 13.9 mm, pcl 10.3 mm), 1 ovigerous female (cl 14.2 mm, pcl 11.1 mm), Laccadive Sea, southwest of Wadge Bank, off the Travancore coast, 7°17'30"N 76°54'30"E, 430 fathoms [787 m], bottom temp 3.3°C, RIMSS *Investigator* Stn 232, 19 October 1897.

**Other material examined.**—**Madagascar:** MNHN IU-2011-5082 (Ga1426), 1 male (cl 12.2 mm, pcl 8.8 mm), 1 ovigerous female (cl 9.6 mm, pcl 7.0 mm), 22°18.9'S 43°01.1'E, 735–760 m, Chalutage 108, coll. A. Crosnier, 30 November 1973.

**Diagnosis.** Rostrum broad, flat, medially carinate, trifid distally. Carapace unarmed dorsally; surface of dorsal half smooth or with faint short striae; lateral margins with 4 spines (1 anterolateral, 3 branchial); posterior orbital margin transverse; outer orbital spine distinct. Abdominal tergites unarmed. Telson with 8 plates. Maxilliped 3 merus flexor margin with 2 or 3 spines. Cheliped carpus length less than twice width, dorsal surface unarmed; merus with 2 longitudinal rows of prominent spines (mesial, ventromesial). Walking leg meri unarmed or minutely spinose along extensor margin; dactylus flexor margin with movable spines, and more slender movable spine at base of corneous unguis. Pereopods without epipods.

**Description.** *Carapace:* Moderately convex from side to side; sparsely covered with short, fine setae; surface of anterior half smooth, with few scattered, fine short striae; surface of posterior half with fine distinct striae. Cervical groove indistinct. Epigastric spines absent. Posterior orbital margins transverse to slightly oblique, outer orbital spine prominent. Frontal margins oblique; anterolateral spine similar to outer orbital spine. Lateral margins broadly convex; with 2 spines on anterior branchial margin and spine at junction of anterior and posterior branchial margins. Rostrum broad, 0.3–0.4 pcl; trifid distally; apex slightly deflected dorsally; median carina distinct; lateral proximal margin convex. Posterior margin unarmed. Pterygostomian flap with short diagonal striae; anterior margin blunt, angular.

*Sternum:* Sternite 3 about 0.3 width of sternite 4. Posterior margin of sternite 3 contiguous with anterior margin of sternite 4. Sternites smooth, sparsely setose, unarmed.

*Abdomen:* Tergites with short, fine, scattered setae, unarmed. Tergites 2–4 with elevated anterior ridge; tergites 2 and 3 also with shallow groove behind anterior ridge. Tergites 4 and 5 with shallow, medially interrupted, transverse groove. Tergite 6 smooth; posterior margin not strongly produced. Telson composed of 8 plates (minute central plate present); lateral margin of midlateral plate lined with coarse, relatively stiff setae in males, distally setose in females. Uropodal endopod lateral margins setose, unarmed.

*Eye:* Ocular peduncle unarmed, sparsely setose; movable; partially concealed by rostrum. Cornea subglobular, slightly wider than peduncle. Small, slender spine adjacent to lateral margin of eye.

*Antennule:* Basal article squat, with 2 distolateral spines, dorsal spine shorter; distomesial margin with short triangular tooth.

*Antenna:* Basal article with triangular mesial and lateral tooth, neither overreaching article 2. Article 2 with strong distolateral spine, reaching beyond midlength but not apex of article 3. Article 3 with short distomesial spine. Article 4 with lateral triangular projection. Flagellum as long as cl.

*Maxilliped 3:* Dactylus, propodus and carpus unarmed. Merus extensor margin with small distal spine, dorsal margin smooth, unarmed; flexor margin with 2 large triangular spines proximally and usually 1 minute spine distally (absent on left side of holotype). Ischium longer than wide, with distal flexor and extensor spine. Crista dentata with 25–28 denticles.

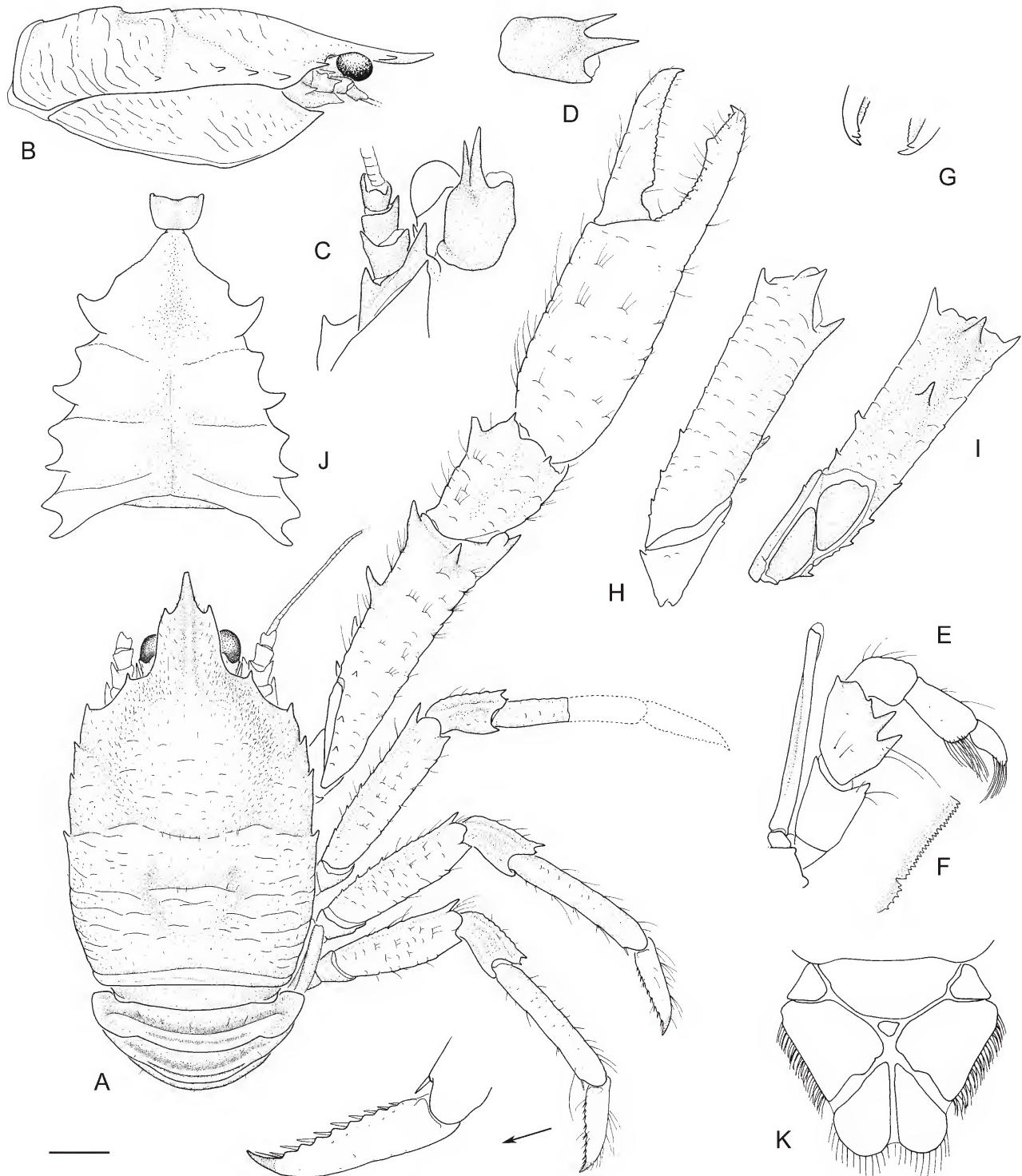


Figure 1. *Munidopsis alcocki* sp. nov., male holotype, cl 13.6 mm, pcl 10.1 mm (AM P2701). (A) dorsal habitus; (B) carapace, right lateral view; (C) right antenna and antennule, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped finger tips, ventral view; (H) right cheliped ischiomerus, lateral view; (I) right ischiomerus, mesial view; (J) sternal plastron; (K) telson. Scale: A, B, G–I = 2.0 mm; C–F, J, K = 1.0 mm.

**Pereopod 1 (cheliped):** Cheliped elongate, 2.3–2.9 pcl (males), 2.3–2.5 (females); with sparsely distributed, simple golden setae, most numerous on dorsal and ventral margins; subcylindrical to ovate. Ischium with dorsal spine; small ventrodistal spine (reduced to low tubercle in holotype). Merus with row of 3–5 small dorsal spines on proximal half to two-

thirds; mesial margin with 2 large mesial spines, one distally at carpal articulation, one slightly distal to midlength of margin; ventromesial margin with 1–3 (usually 2) strong spines proximally and distal spine. Carpus stout, about 1.4–1.7 times longer than wide; dorsal margin with distal and subdistal spine, latter largest; small laterodistal spine. Propodus unarmed,

palm 1.9–2.2 times as long as wide; mesial margin of palm as long as or longer than dactylus. Pollex and dactylus occlusal margins crenulated, apices with interlocking teeth; pollex occlusal margin with low tooth distal to midlength in male holotype, without gape in female paratype; dactylus occlusal margin with low proximal tooth. Epipod absent.

**Pereopods 2–4:** Slightly compressed; decreasing in length posteriorly, with scattered, setose striae. Merus elongate; length about 4 times width (pereopod 2) to about 3 times width (pereopod 4); extensor margin or with 3–7 small spines (pereopods 2 and 3) or unarmed (pereopod 4); distal extensor margin with large distal spine; flexor margin irregular but not spinose except for angular distal spine. Carpus with distal extensor spine and small acute tubercle near propodal articulation; extensor margin irregular or serrated (but not spinular); with low, irregular, dorsal carina. Propodus extensor margin irregular, unarmed; flexor margin with movable spine at distal one-third and paired movable spines distally adjacent to dactylar articulation. Dactylus about two-thirds propodus length; extensor margin unarmed, with scattered setae; flexor margin with 9 or 10 short triangular teeth, each bearing corneous movable spine and more slender movable spine at base of corneous unguis. Epipods absent.

*Egg diameter:* 1.2–1.5 mm.

**Colour in life.** Unknown.

**Etymology.** Named in honour of Alfred William Alcock (1859–1933) for his major contributions to eastern Indian Ocean deep-sea zoology, especially carcinology.

**Remarks.** Previous records of *M. serricornis* (also as *M. tridentata* and *M. ?rosacea*) from the northern Indian Ocean (Alcock & Anderson, 1899a, b; Alcock, 1901) and Madagascar (Macpherson, 2007) are referable to *M. alcocki* sp. nov. In addition to the RIMSS *Investigator* specimens examined here from the Bay of Bengal, Alcock (1899, 1901a) recorded material from the following *Investigator* station: Stn 218, off North Maldivian Atoll, 6°55'06"N 72°55'E, 210 fathoms [384 m], bottom temperature 11.1°C, 21 October 1896.

Northern specimens of *M. alcocki* agree well with those from Madagascar. Sexual dimorphism in cheliped length is evident in all but the two smallest specimens (male pcl 7.0 mm, female pcl 8.8 mm, MNHN IU-2011-5082), which have similar proportional cheliped lengths (2.3 pcl). Above this size, proportional male and female cheliped lengths differ (males 2.8–2.9 pcl; females 2.4–2.5 pcl). The two ovigerous females carried two (MNHN IU-2011-5082) and eight eggs (ZMUC CR10114), respectively.

As with *M. serricornis* in the Atlantic Ocean, *M. alcocki* may be associated with deepwater corals, having been collected together with *Caryophyllia paradoxus* Alcock, *Javania cailleti* (Duchassaing & Michelotti) (as *Desmophyllum vitreum* Alcock), *Madrepora oculata* Linnaeus (as *Lophohelia investigatoris* Alcock), and *Solenosmilia variabilis* Duncan (as *S. jeffreyi* Alcock) (see Alcock & Anderson, 1899a).

*Munidopsis alcocki* is most similar to *M. serricornis* from the Western Atlantic and *M. modesta* Benedict, 1902 from the eastern Pacific in lacking epigastric spines but is readily distinguished by its minutely rather than strongly spinose extensor margins on the meri of the walking legs.

**Distribution.** Indian Ocean from Madagascar to the Laccadive Sea, Maldives and Bay of Bengal; 384–787 m.

## *Munidopsis atlantis* sp. nov.

Figs 2, 9

**Type material.** HOLOTYPE: OUMNH.ZC.2013-01-007, ovigerous female (cl 9.8 mm, pcl 6.8 mm), Atlantis Bank, Southwest Indian Ridge, 32°42.862'S 57°14.666'E, 1117 m, RRS *James Cook* cruise JC066, ROV *Keel 6000*, 10 December 2011.

**Diagnosis.** Rostrum broad, flat, medially carinate, trifid distally. Carapace with pair of epigastric spines, otherwise unarmed dorsally; surface of dorsal half with granules and short rugae; lateral margins with 4 spines (1 anterolateral, 3 branchial); posterior orbital margin transverse; outer orbital spine distinct. Abdominal tergites unarmed. Telson with 8 plates. Maxilliped 3 merus flexor margin with 2 spines. Cheliped carpus length twice width, dorsal surface unarmed. Walking leg meri irregular to serrated along extensor margin; dactylus flexor margin with movable spines, and more slender movable spine at base of corneous unguis. Pereopods without epipods.

**Description.** *Carapace:* Moderately convex from side to side; surface with few scattered short setae, almost glabrous; surface of anterior half with granules and small rugae or short striae; surface of posterior half with short striae. Cervical groove indistinct. Pair of epigastric spines flanked by short scales. Posterior orbital margins transverse, outer orbital spine prominent. Frontal margins oblique, concave; anterolateral spine similar to outer orbital spine. Lateral margins subparallel; with 2 spines on anterior branchial margin and blunt spine at junction of anterior and posterior branchial margins. Rostrum broad, 0.4 pcl; trifid distally; apex horizontal; median carina distinct; lateral proximal margin weakly convex, tapering. Posterior margin unarmed, shallowly concave medially. Pterygostomian flap with short diagonal striae posteriorly and short rugae anteriorly; anterior margin blunt, angular.

*Sternum:* Sternite 3 about 0.3 width of sternite 4. Posterior margin of sternite 3 contiguous with anterior margin of sternite 4. Sternites smooth, sparsely setose, unarmed.

*Abdomen:* Tergites unarmed; surface with few scattered setae, almost glabrous. Tergites 2–4 with elevated anterior ridge; tergites 2 and 3 also with shallow groove behind anterior ridge. Tergites 4–6 smooth; posterior margin not strongly produced. Telson composed of 8 plates (minute central plate present). Uropodal endopod lateral margins setose, unarmed.

*Eye:* Ocular peduncle unarmed, glabrous; movable; partially concealed by rostrum. Cornea subglobular, slightly wider than peduncle. Small, slender spine adjacent to lateral margin of eye.

*Antennule:* Basal article squat, with 2 distolateral spines, dorsal shorter; distomesial margin with short triangular tooth.

*Antenna:* Basal article with triangular mesial and lateral tooth, neither overreaching article 2. Article 2 with strong distolateral spine, reaching midlength of article 3. Articles 3 and 4 unarmed. Flagellum 1.2 pcl.

*Maxilliped 3:* Dactylus, propodus and carpus unarmed. Merus extensor margin with distal spine; flexor margin with 2 large triangular spines proximally and 2 low tubercles distally. Ischium longer than wide, with acute distal flexor and extensor angles. Crista dentata with 26–30 denticles.

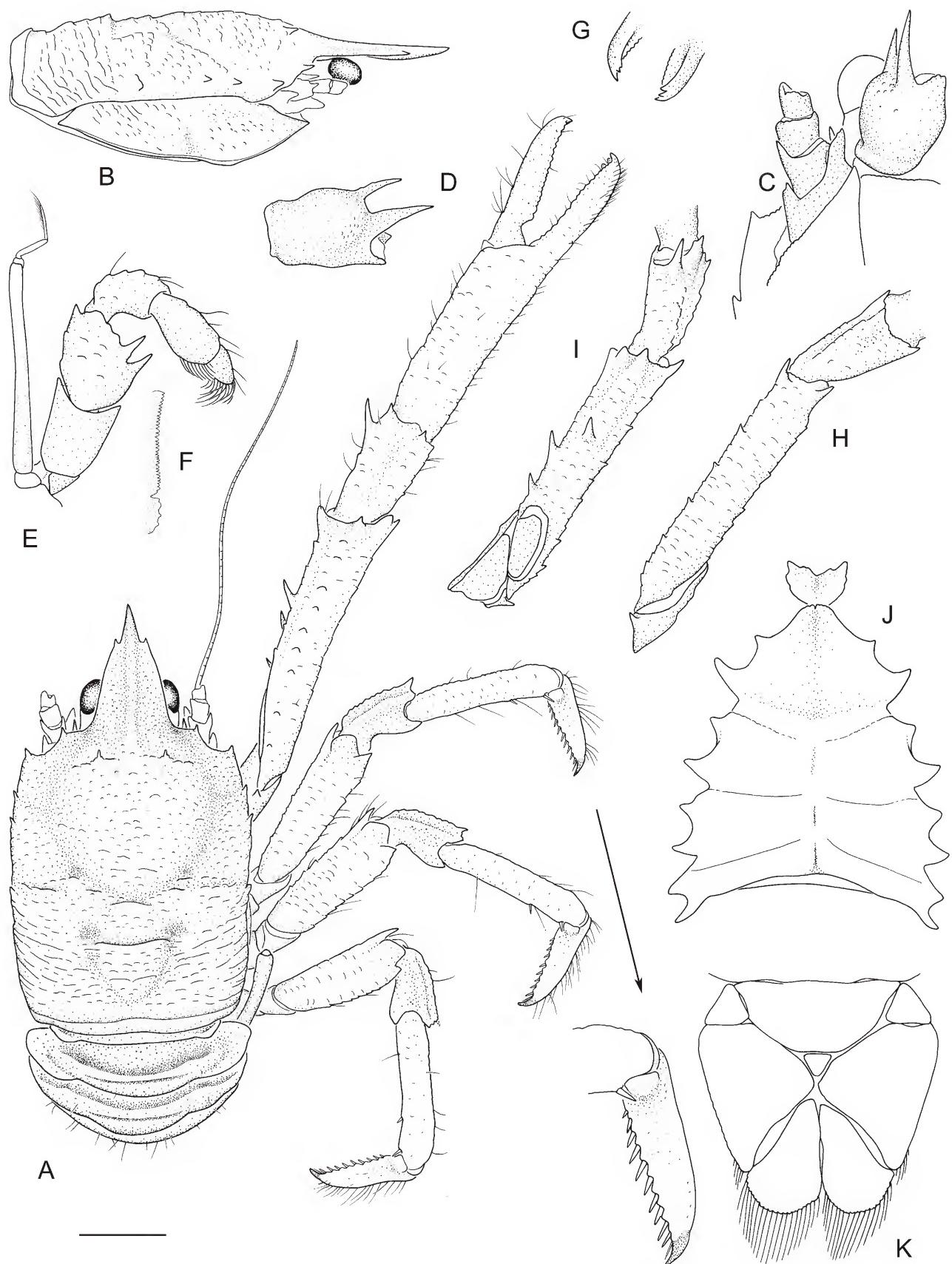


Figure 2. *Munidopsis atlantis* sp. nov., ovigerous female holotype, cl 9.8 mm, pcl 6.8 mm (OUMNH.ZC.2013-01-007). (A) dorsal habitus; (B) carapace, right lateral view; (C) right antenna and antennule, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped finger tips, ventral view; (H) right cheliped ischiomerus, lateral view; (I) right ischiomerus, mesial view; (J) sternal plastron; (K) telson. Scale: A, B, G-I = 2.0 mm; C-F, J, K = 1.0 mm.

**Pereopod 1 (cheliped):** Cheliped elongate, 2.7 pcl, sparse simple golden setae, most numerous on dorsal and ventral margins; subcylindrical to ovate. Ischium with dorsal spine; without ventral spine. Merus with row of 4 or 5 small, graded, well-spaced dorsal spines and large distal dorsal spine; mesial margin with 2 large spines, one distally at carpal articulation, one at distal one-third of margin; ventromesial margin with 2 strong proximal spines and distal spine. Carpus length about 2 times width; mesial margin with distal and subdistal spine, latter largest; small dorsodistal and ventrodistal spine. Propodus unarmed, palm about 2.7 times as long as wide; mesial margin of palm longer than dactylus. Pollex and dactylus occlusal margins crenulated, apices with interlocking teeth, small proximal gape on dactylus. Epipod absent.

**Pereopods 2–4:** Slightly compressed; decreasing in length posteriorly; with scattered, setose striae. Merus elongate; length 3.4 times width (pereopod 2) to 2.8 (pereopod 4); extensor margin irregular to serrated but not spinose; distal extensor margin with large distal spine; flexor margin irregular but not spinose except for triangular distal spine. Carpus with distal extensor spine and irregular to serrated margin; low, irregular, dorsal carina. Propodus extensor margin irregular, unarmed; flexor margin with movable spine at distal one-third and paired movable spines distally adjacent to dactylar articulation. Dactylus about two-thirds propodus length; extensor margin with scattered setae, unarmed; flexor margin with 9 or 10 low triangular teeth, each bearing corneous movable spine and more slender movable spine at base of corneous unguis. Epipods absent.

Egg diameter: 1.5 mm.

**Colour in life.** Unknown.

**Etymology.** From the type locality, Atlantis Bank; used as a noun in apposition.

**Remarks.** *Munidopsis atlantis* sp. nov. is most similar to *M. comarge* and *M. ternaria* in the combination of a granulated and rugose anterior half of the carapace and serrated but not spinose extensor meral margins of the walking legs. It resembles *M. ternaria* (and differs from *M. comarge*) in having epigastric spines and differs from both species in having lateral carapace spines behind the anterolateral spine. *Munidopsis atlantis* and *M. macphersoni* differ in the number of lateral spines on the carapace behind the anterolateral spine, three in the latter, four in the former. *Munidopsis atlantis* is also superficially similar to *M. crinita* Faxon, 1893, from the eastern Pacific in sharing the presence of epigastric spines and unarmed extensor margins of the meri of the walking legs, but is readily distinguished by the glabrous or sparsely setose, rather than, densely setose body and chelipeds.

Macpherson *et al.* (2014) recently described *Munidopsis mandelai* from Atlantis Bank and Middle of What Seamount at 703–1135 m depth; it is readily distinguished from *M. atlantis* in the absence of lateral rostral spines and presence of eyespines.

**Distribution.** Presently known only from Atlantis Bank, Southwest Indian Ridge; 1117 m.

### *Munidopsis macphersoni* sp. nov.

Figs 3, 9

**Type material.** HOLOTYPE: MNHN IU-2010-1429, female (cl 7.8 mm, pcl 5.2 mm), MacDonald Bank, Austral Islands, French Polynesia, 29°00'S 140°14.9'W, 488–700 m, BENTHAUS DW1874, RV *Alis*, 4 November 2002.

**Diagnosis.** Rostrum broad, flat, medially carinate, trifid distally. Carapace with pair of epigastric spines, otherwise unarmed dorsally; surface of dorsal half with granules and short rugae; lateral margins with 5 spines (1 anterolateral, 4 branchial); posterior orbital margin transverse; outer orbital spine distinct. Abdominal tergites unarmed. Telson with 8 plates. Maxilliped 3 merus flexor margin with 2 or more spines. Cheliped carpus length less than twice width, dorsal surface unarmed. Walking leg meri spinose along extensor margin; dactylus flexor margin with movable spines and more slender movable spine at base of corneous unguis. Pereopods without epipods.

**Description.** **Carapace:** Moderately convex from side to side; surface with few scattered short setae, almost glabrous; surface of anterior half with granules and small rugae or short striae; surface of posterior half with short striae. Cervical groove indistinct. Pair of epigastric spines. Posterior orbital margins transverse, outer orbital spine prominent. Frontal margins oblique, slightly concave; anterolateral spine similar to outer orbital spine. Lateral margins broadly convex; with 3 blunt spines on anterior branchial margin and spine at junction of anterior and posterior branchial margins. Rostrum broad, slightly less than 0.5 pcl; trifid distally; apex slightly deflected dorsally; median carina distinct; lateral proximal margin convex. Posterior margin unarmed. Pterygostomian flap with short diagonal striae; anterior margin blunt, angular.

**Sternum:** Sternite 3 about one-third width of sternite 4. Posterior margin of sternite 3 contiguous with anterior margin of sternite 4. Sternites smooth, sparsely setose, unarmed.

**Abdomen:** Tergites unarmed; surface with few scattered short setae, almost glabrous. Tergites 2–4 with elevated anterior ridge; tergites 2 and 3 also with shallow groove behind anterior ridge. Tergites 4 and 5 with shallow, medially interrupted, transverse groove. Tergite 6 smooth; posterior margin not strongly produced. Telson composed of 8 plates (minute central plate present). Uropodal endopod lateral margins setose, unarmed.

**Eye:** Ocular peduncle unarmed, glabrous; movable; partially concealed by rostrum. Cornea subglobular, slightly wider than peduncle. Small, slender spine adjacent to lateral margin of eye.

**Antennule:** Basal article squat, with 2 subequal distolateral spines; distomesial margin with short rounded tooth.

**Antenna:** Basal article with triangular mesial and lateral tooth, neither overreaching article 2. Article 2 with strong distolateral spine, reaching midlength of article 3. Articles 3 and 4 unarmed. Flagellum slightly longer than pcl.

**Maxilliped 3:** Dactylus, propodus and carpus unarmed. Merus extensor margin with distal spine; flexor margin with 2 large triangular spines proximally and 2 smaller spines

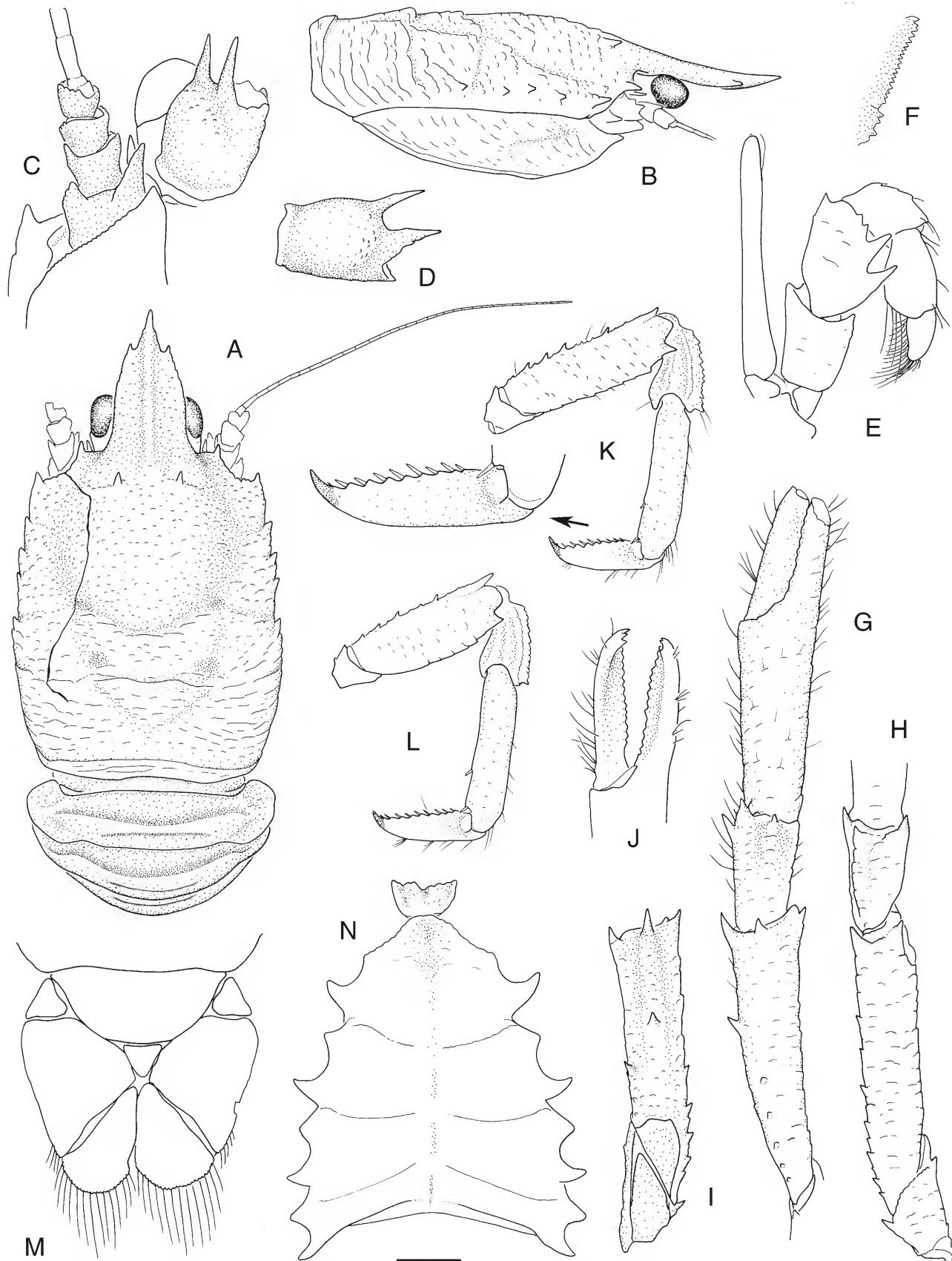


Figure 3. *Munidopsis macphersoni* sp. nov., female holotype, cl 7.8 mm, pcl 5.2 mm, (MNHN IU-2010-1429). (A) cephalothorax and abdomen, dorsal; (B) carapace, right lateral view; (C) right antenna and antennule, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped dorsal view; (H) right cheliped carpus and ischiomerus, lateral view; (I) right ischiomerus, mesial view; (J) left cheliped fingers, ventral view; (K) right pereopod 2, dorsal view; (L) right pereopod 3, dorsal view; (M) telson; (N) sternal plastron. Scale: A, B, G–L = 1.0 mm; C–F, M, N = 0.5 mm.

distally. Ischium longer than wide, with acute distal flexor and extensor angles. Crista dentata with 17 or 18 denticles.

**Pereopod 1 (cheliped):** Cheliped elongate, 2.7 pcl, simple golden setae, most numerous on dorsal and ventral margins; subcylindrical to ovate. Ischium with dorsal spine; without ventral spine. Merus with row of 5 or 6 small, graded dorsal spines along proximal half and large distal dorsal spine; mesial margin with 2 large spines, one distally at carpal articulation, one at distal one-third of margin; ventromesial margin with small proximal spine and strong distal spine. Carpus about 1.8 times longer than wide; mesial margin with distal and subdistal spine, latter largest; small dorsodistal and ventrodistal spine. Propodus unarmed, palm about 2.5 times as long as wide; mesial margin of palm longer than dactylus. Pollex and dactylus occlusal margins crenulated, apices with interlocking teeth. Epipod absent.

**Pereopod 2–3 (pereopod 4 unknown):** Slightly compressed; decreasing in length posteriorly; with scattered, setose striae. Merus elongate; length about 3.4 times width (pereopod 2); extensor margin with short upright spines; distal extensor margin with large distal spine; flexor margin irregular but not spinose except for strong distal spine. Carpus with distal extensor spine and serrated margin; with low, irregular, dorsal carina. Propodus extensor margin straight, unarmed; flexor margin with movable spine at distal one-third and paired movable spines distally adjacent to dactylar articulation. Dactylus about two-thirds propodus length; extensor margin with scattered setae, unarmed; flexor margin with 8 low triangular teeth, each bearing corneous movable spine and more slender movable spine at base of corneous unguis. Epipods absent.

#### Colour in life.

Unknown.

**Etymology.** Named for Enrique Macpherson, for his major contributions to galatheoid systematics.

**Remarks.** *Munidopsis macphersoni* sp. nov., together with the eastern Pacific *M. crinita* Faxon, 1893, differ from other *serricornis*-complex species in having four instead of three branchial or no marginal spines on the carapace behind the anterolateral spine. *Munidopsis macphersoni* is readily distinguished from *M. crinita* in having an almost glabrous body and sparsely setose chelipeds. In *M. crinita*, the carapace and chelipeds are densely setose. Of other *serricornis*-complex species, *M. macphersoni* resembles, *M. ternaria*, *M. comarge* and *M. atlantis* sp. nov. in the granular rather than smooth or weakly striate dorsal surface of the anterior half of the carapace. The new species agrees with *M. atlantis* sp. nov., and differs from *M. ternaria* and *M. comarge* in having distinct (albeit blunt) teeth along the branchial margins; these margins are unarmed in the latter two species. From *M. atlantis*, *M. macphersoni* differs in having three instead of four marginal branchial spines on the carapace.

**Distribution.** Presently known only from the Austral Islands, French Polynesia; 488–700 m.

#### *Munidopsis nias* sp. nov.

Figs 4, 5, 9

*Munidopsis (Galathodes) tridentata*.—Doflein & Balss, 1913: 158 [Indonesian specimens only].

*Munidopsis serricornis*.—Baba & Poore, 2002: fig. 6D, 7C, 8C, 9E.

**Type material.** HOLOTYPE: ZMB 17506, male (cl 13.4 mm, pcl 10.0 mm), off SE Nias, Indonesia, 0°27'N 98°07'E, 646 m, Deutsche Tiefsee Expedition, stn 196, 1 February 1899. PARATYPES: ZMB 17505, 2 ovigerous females (cl 11.9+ mm, pcl 9.4 mm; cl 11.6 mm, pcl 8.6 mm), 1 juvenile female (cl 6.0 mm, pcl 4.0 mm), collected with holotype.

**Diagnosis.** Rostrum broad, subquadrate, flat, medially carinate, trifid distally. Carapace unarmed dorsally; surface of dorsal half smooth; lateral margins with 4 spines (1 anterolateral, 3 branchial); posterior orbital margin transverse; outer orbital spine distinct. Abdominal tergites unarmed. Telson with 7 plates. Maxilliped 3 merus flexor margin with 1 spine. Cheliped merus with 3 longitudinal rows of prominent spines (dorsal, mesial, ventromesial). Walking leg meri and carpi distinctly spinose along extensor margin; pereopod 2 merus stout, length 2.5 times width; dactylus flexor margin with movable spines, distalmost remote from corneous unguis. Pereopods without epipods.

**Description of adults.** **Carapace:** Moderately convex from side to side; finely setose; surface of anterior half smooth, at most with very fine, short striae; surface of posterior half with fine striae. Cervical groove indistinct. Epigastric spines absent, at most a transverse row of short rugae. Posterior orbital margins transverse to slightly oblique, outer orbital spine prominent. Frontal margins oblique, slightly concave; anterolateral spine similar to outer orbital spine. Lateral margins broadly convex; carapace widest in posterior half; with 2 spines on anterior branchial margin and spine at junction of anterior and posterior branchial margins. Rostrum broad, subquadrate, 0.3–0.4 pcl; trifid distally; apex horizontal; median carina weakly indicated; lateral proximal margin straight or weakly convex. Posterior margin unarmed. Pterygostomian flap with short diagonal striae; anterior margin angular.

**Sternum:** Sternite 3 about one-third width of sternite 4. Posterior margin of sternite 3 broadly contiguous with anterior margin of sternite 4. Sternites smooth, sparsely setose, unarmed.

**Abdomen:** Tergites unarmed; surface with few scattered short setae, almost glabrous. Tergites 2–4 with elevated anterior ridge; tergites 2 and 3 also with shallow groove behind anterior ridge. Tergites 4–6 smooth; posterior margin not produced. Telson composed of 7 plates (minute central plate absent); lateral margin of midlateral plate lined with coarse, relatively stiff setae in males, non-setose in females. Uropodal endopod lateral margins setose, unarmed.

**Eye:** Ocular peduncle sparsely setose; movable; partially concealed by rostrum. Cornea subglobular, slightly wider than peduncle. Slender spine adjacent to lateral margin of eye.

**Antennule:** Basal article squat, with 2 distolateral spines, dorsal shorter; distomesial margin with short triangular tooth.

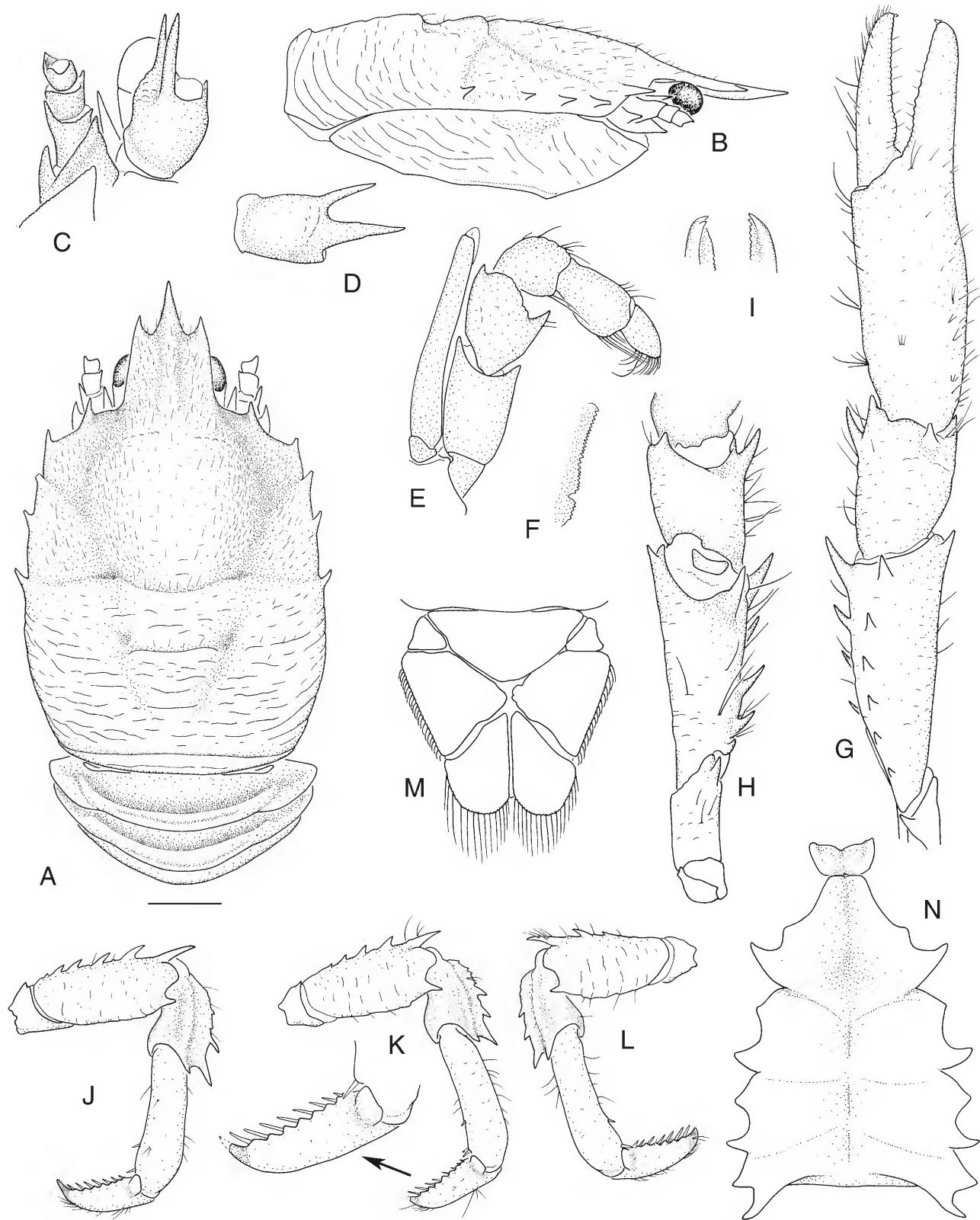


Figure 4. *Munidopsis nias* sp. nov., male holotype, cl 13.4 mm, pcl 10.0 mm (ZMB 17506). (A) cephalothorax and abdomen, dorsal; (B) carapace, right lateral view; (C) right antenna and antennule, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped dorsal view; (H) right cheliped carpus and ischiomerus, ventral view; (I) right cheliped finger tips, ventral view; (J) right pereopod 2, dorsal view; (K) right pereopod 3, dorsal view; (L) left pereopod 4, dorsal view; (M) telson; (N) sternal plastron. Scale: A, B, G–L = 2.0 mm; C–F, M, N = 1.0 mm.

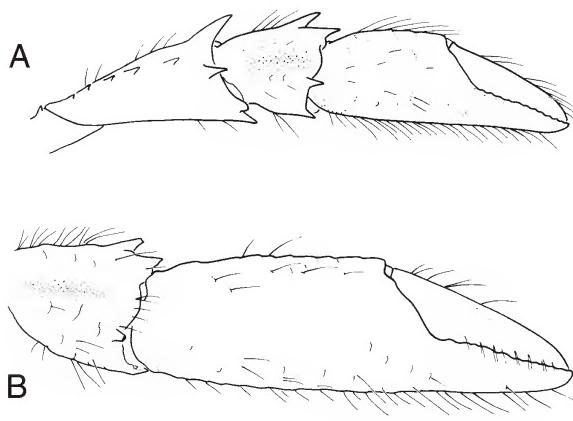


Figure 5. *Munidopsis nias* sp. nov., female paratypes (ZMB 17506), right cheliped. (A) pcl 4.0 mm; (B) pcl 9.4 mm. Scale = 1.0 mm.

**Antenna:** Basal article with triangular mesial and lateral tooth, neither overreaching article 2. Article 2 with strong distolateral and distomesial spine, former reaching beyond midlength of article 3. Article 3 with mesial spine. Article 4 with triangular lateral projection. Flagellum about as long as pcl.

**Maxilliped 3:** Dactylus, propodus and carpus unarmed. Merus extensor margin with distal spine; flexor margin with 1 large, sharp, triangular spine. Ischium longer than wide, with acute distal flexor and extensor angles. Crista dentata with 22 or 23 denticles.

**Pereopod 1 (cheliped):** Elongate, 2.3 pcl in both sexes, simple golden setae, most numerous on dorsal and ventral margins; subcylindrical to ovate. Ischium with ventrodistal spine and dorsal spine. Merus with longitudinal row of 4–6 graded dorsal spines and large distal dorsal spine; mesial margin with 1 or 2 large spines, one distally at carpal articulation, one at distal one-fourth of margin (absent in female paratypes); ventromesial margin with proximal row of 3 proximal spines (first spine smallest) and strong distal spine. Carpus 1.2–1.5 times longer than wide; mesial margin with distal and subdistal spine, latter largest; dorsodistal and ventrodistal spine; occasionally with small lateral distal spine. Propodus unarmed, palm about twice as long as wide; mesial margin of palm longer than dactylus. Pollex and dactylus occlusal margins crenulated, apices with interlocking teeth. Epipod absent.

**Pereopods 2–4:** Slightly compressed; decreasing in length posteriorly; with scattered, setose striae. Merus stout; length about 2.4 times width (pereopod 2) to 2.0 (pereopod 4); extensor margin with 4 or 5 (pereopods 2 and 3) and 2 or 3 (pereopod 4) slender, obliquely directed spines and slender distal spine; flexor margin irregular, with distal spine. Carpus with distal extensor spine and row of 2 or 3 slender spines and several minute spines or serrations; with low, irregular, dorsal carina terminating in spine. Propodus extensor unarmed; flexor margin with movable spine at distal one-fourth and paired movable spines distally adjacent to dactylar articulation. Dactylus about two-thirds propodus length; extensor margin with scattered setae, unarmed; flexor margin with 7 or 8 low triangular teeth, each bearing corneous movable spine, without slender movable spine at base of unguis. Epipods absent.

**Egg diameter:** 1.2 mm.

**Colour in life.** Unknown.

**Etymology.** Named after the type locality, Nias, Indonesia; used as a noun in apposition.

**Remarks.** Records of *Munidopsis tridentata* from off Sumatra, Indonesia (Doflein & Balss, 1913) collected by the Valdivia, are referable to *M. nias* sp. nov. *Munidopsis nias* sp. nov. is most similar to *M. acuminata* Benedict, 1902 (type locality: western Atlantic, off South Carolina) and *M. pubescens* Macpherson, 2007 (type locality: Madagascar) in sharing the broad, subquadrate, distally tridentate rostrum; unarmed dorsal surface of the carapace and abdomen; seven telson plates; short, squat, pereopods 2–4 with the length of the pereopod 2 merus not more than 2.5 times the width (versus about 3–4 times width) and two distal spines on the carpus. The new species differs from *M. acuminata* in lacking the epipod on the cheliped, having a straight or convex rather than slightly concave dorsal margin on the cheliped dactylus (Fig 4A, 5A, B) and the smooth versus rugose surface on the anterior half of the carapace. *Munidopsis nias* differs from *M. pubescens* in the smooth versus rugose anterior carapace surface, having a row of prominent spines on the extensor margin of the carpus of pereopods 2–4, a row of dorsal spines on the merus of the chelipeds and more extensive striation on the branchial regions of the carapace.

Variation in the type series of *M. nias* is slight, the main adult difference being in the number of mesial spines on the cheliped merus: two in the male holotype, one in the female paratypes. The juvenile female (pcl 4.0 mm) (Fig. 5A) has rudimentary pleopods and differs chiefly from the adults in having relatively more pronounced carapace spines, proportionally shorter chelipeds (twice pcl), fewer mesial and ventromesial spines on the merus of the chelipeds, and a proportionally shorter cheliped palm (slightly shorter than the dactylus versus longer in adults).

In addition to Indonesian material identified here as *M. nias* sp. nov., Doflein & Balss (1913) also reported material from off East Africa under the name *M. tridentata*. Given the strong similarities between *M. nias* and *M. pubescens*, Doflein & Balss' (1913) East African records are probably referable to the latter species. Baba & Poore's (2002: fig. 6D, 7C, 8C, 9E) record of *M. serricornis* from off Nias, Indonesia (Valdivia stn 198, 677 m), is referable to *M. nias*. Material reported by Laurie (1926) as *M. tridentata* from Saya de Malha could not be located for the present study (Matt Lowe, pers. com., UMC), but are tentatively referred to *M. pubescens* Macpherson, 2007, described from Madagascar. Laurie's (1926) account was brief, but consistent with *M. pubescens*: the extensor margins of the meri of the walking legs are spinose, the carpi of the walking legs have two distal spines and only a single longitudinal row of spines on the cheliped merus (always two or three rows in *M. nias*). The Saya de Malha specimens probably also lacked epigastric spines as in *M. pubescens*; were epigastric spines present, they would almost certainly have been mentioned given Laurie's (1926) succinct but detailed account of carapace and pereopodal spination. Saya de Malha is also geographically adjacent to the type locality of *M. pubescens*, Madagascar.

**Distribution.** Presently known only from the eastern Indian Ocean between Nias (Sumatra, Indonesia) and the Nicobar Islands; 646–805 m.

## *Munidopsis pyrochela* sp. nov.

Figs 6, 9

*Munidopsis* sp.—O’Shea *et al.*, 1999: 51, fig. 27; Poore *et al.*, 2011, pl. 23F.

*Munidopsis serricornis*.—Baba & Poore, 2002: 241–244, figs. 6 A, B, 7A, 8A, 9A, B [part]; Ahyong & Poore, 2004: 46, 57; Poore, 2004: 235, 237, fig. 65g; Yaldwyn & Webber, 2011: 214.

*Munidopsis* cf. *serricornis*.—Webber *et al.*, 2010: 226; Taylor *et al.*, 2010: 15; Rowden *et al.*, 2011: 73.

**Type material.** (Chatham Rise, New Zealand). HOLOTYPE: NIWA 67818, male (cl 13.0 mm, pcl 9.3 mm), Ritchie Seamount, E Chatham Rise, 44°10.0–10.1'S 174°34.4–35.7W, 836–1100 m, orange roughy trawl, TRIP 2551/82, sample 1, in crevice in glass sponge (*Farrea similaris* Reiswig & Kelly), 18 December 2007. PARATYPES: NIWA 53274, 1 male (cl 7.2 mm, pcl 4.9 mm), 42°38.66–38.67'S 179°52.88–53.05'W, 1052–1080 m, Mummy Seamount, RV *Tangaroa*, TAN0905/48, 18 June 2009; NIWA 67819, 1 male (cl 15.0 mm, pcl 10.9 mm), 2 females (cl 11.9–15.3 mm, pcl 8.7–11.3 mm), Mummy Seamount, 42°38.69'S 179°53.01'W, 1052–1080 m, RV *Tangaroa*, TAN0905/48, 18 June 2009; NIWA 19203, 2 ovigerous females (cl 16.6–20.0 mm, pcl 11.8–14.6 mm), Zombie Seamount, 42°45.91–45.79'S 179°55.62–55.83'E, 990–1058 m, epibenthic sled, RV *Tangaroa*, TAN0104/198, 19 April 2001; NIWA 19205, 1 male (pcl 13.7 mm), 1 female (cl 19.3 mm, pcl 14.0 mm), Zombie Seamount, 42°45.99–46.08'S 179°55.36–55.18'W, 970–900 m, epibenthic sled, RV *Tangaroa*, TAN0104/337, 20 April 2001; NIWA 19204, 1 male (cl 15.3 mm, pcl 11.3 mm), 1 female (cl 11.4 mm, pcl 8.1 mm), Diabolical Seamount, 42°47.16–46.96'S 179°59.12–59.01'W, 993–900 m, epibenthic sled, RV *Tangaroa*, TAN0104/48, 16 April 2001; NIWA 19206, 2 females (cl 15.3–16.5 mm, pcl 11.2–12.2 mm), Diabolical Seamount, 42°47.16–46.96'S 179°59.12–59.01'W, 993–900 m, epibenthic sled, RV *Tangaroa*, TAN0104/48, 16 April 2001; NIWA 19207, 1 male (cl 12.5 mm, pcl 8.9 mm), 1 female (cl 16.0 mm, pcl 11.3 mm), Diabolical Seamount, 42°47.56–47.70'S 179°58.86–58.60'W, 950–900 m, epibenthic sled, RV *Tangaroa*, TAN0104/47, 16 April 2001; NIWA 67820, 1 male (cl 7.6 mm, pcl 5.4 mm), Voodoo Seamount, 42°44.74–44.61'S 179°55.41–55.11'W, 1051–1129 m, RV *Tangaroa*, TAN0905/42, 18 June 2009; NIWA 19200, 1 female (cl 27.1 mm, pcl 19.9 mm), Chatham Rise, 43°26.7'S 173°30.0'E, 392 m, S0181, dredge, 31 Oct 1979; NIWA 53916, 1 male (cl 15.5 mm, pcl 11.2 mm), 1 ovigerous female (cl 15.9 mm, pcl 11.6 mm), 1 female (pcl 9.8 mm), Ritchie Seamount, 44°10.61'S 174°33.56'W, 760–960 m, with sponge, RV *Tangaroa*, TAN0905/107, 26 June 2009.

**Other material examined.**—**Southern Kermadec Ridge, New Zealand:** NIWA 64816, 1 male (cl 14.7 mm, pcl 10.9 mm), Rumble II West Seamount, 35°21.18'S 178°30.65'E, 1382–1416 m, TAN1007/106, epibenthic sled, 6 June 2010; NIWA 72432, 1 male (cl 13.5 mm, pcl 9.6 mm), Rumble II West Seamount, 35°21.42–21.62'S 178°30.95–31.09'E, 1387–1420 m, TAN1104/40, epibenthic sled, ES20, 8 March 2011; NIWA 72277, 1 male (cl 13.6 mm, pcl 9.5 mm), 1 ovigerous female (cl 15.6 mm, pcl 11.0 mm), Clark Seamount, 36°29.04–28.93'S 177°53.24–53.10'E, 1328–1272 m, TAN1104/20, epibenthic sled, ES10, 3 March 2011; NIWA 72926, 1 damaged male (cl ~19.3 mm, pcl ~14.3 mm), Lillie Seamount, 35°51.44–51.41'S 178°26.88–26.55'E, 1237–1460 m, TAN1104/124, epibenthic sled, ES59, 19 March 2011; NIWA 72879, 1 female (cl 17.5 mm, pcl 13.2 mm), Lillie Seamount, 35°51.65–51.39'S 178°26.90–26.67'E, 1251–1478 m, TAN1104/123, epibenthic sled, ES57, 19 March 2011. **Chatham Rise, New Zealand:** NIWA 24570, 2 males (cl 12.3–18.2 mm, pcl 8.3–12.8 mm), 3 females (cl 17.2–18.4 mm, pcl 12.5–13.6 mm), 42°45'S 179°56'W, 927–1030 m, AMA0501/011, 20 June 2005. **The Snares, New Zealand:** NIWA 19199, 4 ovigerous females (cl 14.5–19.1 mm, pcl 10.3–14.6 mm), 48°02.01'S 166°06.01'E, 935 m, TRIP 1171/12, Z9583, J. Wills, 25 November 1998. **Macquarie Ridge, Southern Ocean:** NIWA 39722, 1 male (cl 19.1 mm, pcl 13.6 mm), 50°05.43–05.31'S 163°28.92–28.32'E, 1077–1408 m, RV *Tangaroa*, TAN0803/33, 1077–1408 m, 1 April 2008. **Tasmania, Australia:** NIWA 19208, 1 female (cl 10.5 mm, pcl 7.6 mm), South Tasman Rise, Southern Ocean, 47°09.000'S 148°43.038'E, 936 m, Z9236, 15 August 1998; AM P61819, 2 males (cl 13.7–20.4 mm, pcl 10.0–15.4 mm), 2 females (cl 14.2–22.2 mm, pcl 10.5–16.3 mm), off St. Patricks Head, Tasmania, 41°35'S 148°14'E, 1100 m, trawl, FRV *Soela*, S05/87/15, K. Graham, 12 July 1987; NMV J58233, 1 ovigerous female (cl 23.6 mm, pcl 17.0 mm), Hill Z16 site, 44°17'32"S 147°04'01"E to

44°17'40"S 147°03'54"E, 1100–1300 m, epibenthic sled, coll. T. O’Hara & T. Costa, 2 April 2007; NMV J58240, 1 male (cl 13.9 mm, pcl 9.7 mm), 1 female (damaged, cl 11.0 mm), Hill Z15 site, 44°13'54"S 147°28'22"E to 44°14'07"S 147°28'03"E, 1100–1350 m, epibenthic sled, coll. T. O’Hara & T. Costa, 3 April 2007; NMV J44746, 1 male (cl 15.4 mm, pcl 11.2 mm), "U" seamount, 82.8 km SSE of South East Cape, 44°19.20'S 147°07.20'E, 1083 m, trapline, FRV *Southern Surveyor*, stn SS1/97-41, coll. T. N. Stranks *et al.*, 27 January 1997. **Southwest Indian Ridge, Indian Ocean:** AM P92563, 1 ovigerous female (cl 14.3 mm, pcl 10.2 mm), Middle of What Seamount, 37°56.795'S 50°27.240'E, 1414 m, RRS *James Cook* cruise JC066, ROV *Keel 6000*, 12 February 2011; OUMNH.ZC.2013-01-008, 1 male (cl 16.6 mm, pcl 12.6 mm), Middle of What Seamount, 37°56.795'S 50°27.240'E, 1414 m, RRS *James Cook* cruise JC066, ROV *Keel 6000*, 12 February 2011.

**Diagnosis.** Rostrum broad, flat, medially carinate, trifid distally. Carapace with pair of epigastric spines, otherwise unarmed dorsally; surface of dorsal half with faint short striae; lateral margins with 4 spines (1 anterolateral, 3 branchial); posterior orbital margin transverse; outer orbital spine distinct. Abdominal tergites unarmed. Telson with 8 plates. Maxilliped 3 merus flexor margin with 2 or 3 spines. Cheliped carpus length less than twice width, dorsal surface unarmed; merus with 3 longitudinal rows of prominent spines (dorsal, mesial, ventromesial). Walking leg meri distinctly spinose along extensor margin; dactylus flexor margin with movable spines, and more slender movable spine at base of corneous unguis. Pereopods without epipods.

**Description.** **Carapace:** Moderately convex from side to side; covered with short, fine setae; surface of anterior half smooth, with few scattered, fine short striae; surface of posterior half with fine distinct striae. Cervical groove indistinct. Pair of epigastric spines. Posterior orbital margins transverse to slightly oblique, outer orbital spine prominent. Frontal margins oblique; anterolateral spine similar to outer orbital spine. Lateral margins broadly convex; with 2 spines on anterior branchial margin and spine (bifid on left side of holotype) at junction of anterior and posterior branchial margins. Rostrum broad, 0.4 pcl; trifid distally; apex slightly deflected dorsally; median carina distinct; lateral proximal margin convex. Posterior margin unarmed, medially concave. Pterygostomian flap with short diagonal striae; anterior margin blunt, angular.

**Sternum:** Sternite 3 about one-fourth width of sternite 4. Posterior margin of sternite 3 contiguous with anterior margin of sternite 4. Sternites smooth, sparsely setose, unarmed.

**Abdomen:** Tergites with short, fine, scattered setae, unarmed. Tergites 2–4 with elevated anterior ridge; tergites 2 and 3 also with shallow groove behind anterior ridge. Tergites 4 and 5 with shallow, medially interrupted, transverse groove. Tergite 6 smooth; posterior margin not strongly produced. Telson composed of 8 plates (minute central plate present); lateral margin of midlateral plate lined with coarse, relatively stiff setae in males, distally setose in females. Uropodal endopod lateral margins setose, unarmed.

**Eye:** Ocular peduncle unarmed, dorsally setose; movable; partially concealed by rostrum. Cornea subglobular, slightly wider than peduncle. Small, slender spine adjacent to lateral margin of eye.

**Antennule:** Basal article squat, with 2 distolateral spines, dorsal shorter; distomesial margin with short triangular tooth.

**Antenna:** Basal article with triangular mesial and lateral tooth, neither overreaching article 2. Article 2 with strong distolateral spine, reaching beyond midlength but not apex of article 3. Article 3 with distomesial spine. Article 4 with

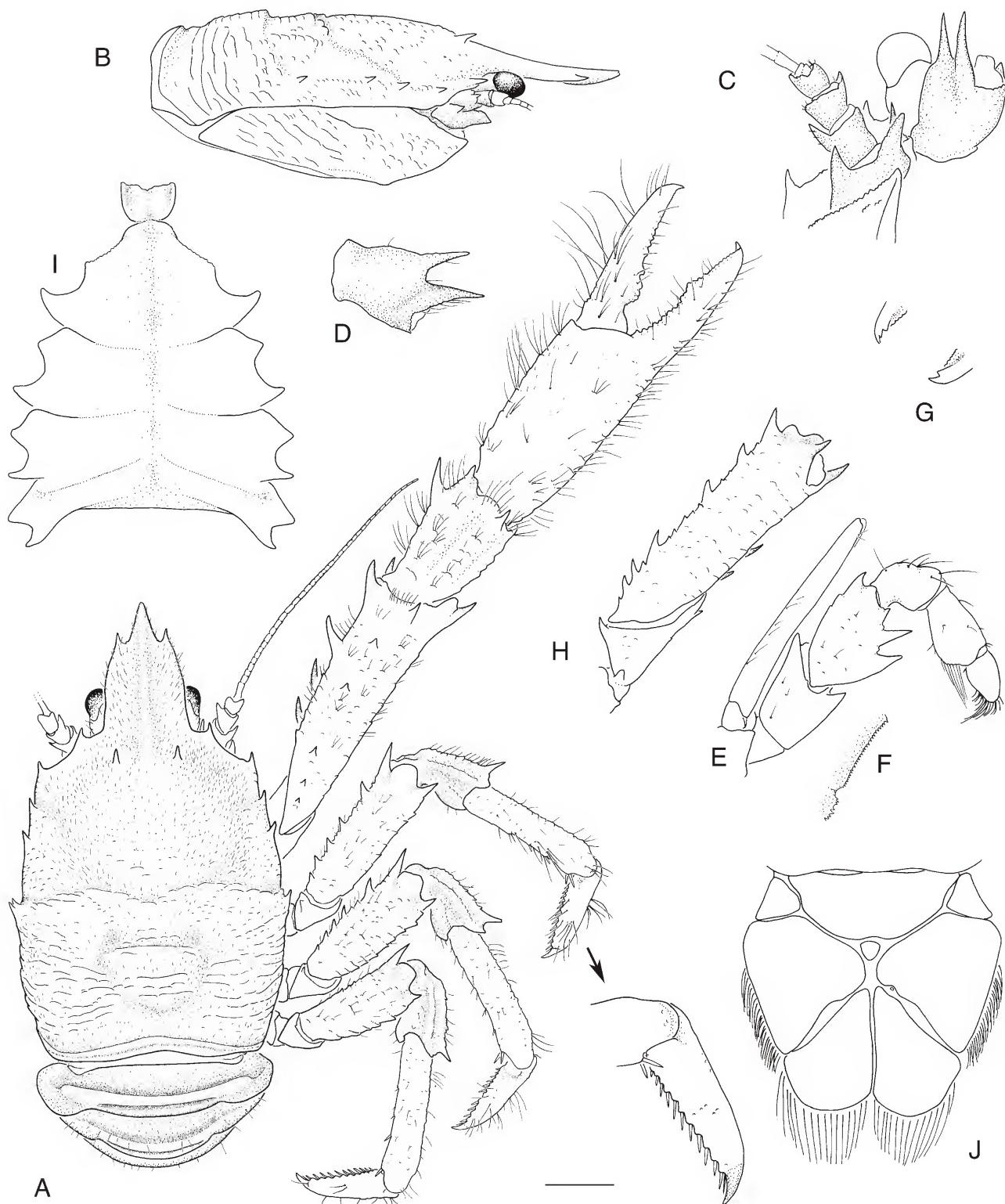


Figure 6. *Munidopsis pyrochela* sp. nov., male holotype, cl 13.0 mm, pcl 9.3 mm (NIWA 67818). (A) dorsal habitus; (B) carapace, right lateral view; (C) right antenna and antennules, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped finger tips, ventral view; (H) right cheliped ischiomerus, lateral view; (I) sternal plastron; (J) telson. Scale: A, B, G–I = 2.0 mm; C–F, J = 1.0 mm.

lateral triangular projection. Flagellum slightly shorter than carapace length.

**Maxilliped 3:** Dactylus, propodus and carpus unarmed. Merus extensor margin with 2 small, blunt to acute tubercles and distal spine; flexor margin with 2 large triangular spines proximally and 1 or 2 smaller spines distally. Ischium longer than wide, with distal flexor and extensor spine.

**Pereopod 1 (cheliped):** Elongate, 2.2–2.9 pcl (males), 2.0–3.0 pcl (females); with tufts of long, simple golden setae, most numerous on mesial and lateral margins; subcylindrical to ovate. Ischium with ventrodistal spine and dorsal spine. Merus with row of 6–8 strong, graded dorsal spines, largest distally; mesial margin with 2 large mesial spines, one distally at carpal articulation, one slightly distal to midlength of margin; ventromesial margin with 1–3 (usually 2) strong spines proximally and distal spine. Carpus 1.5–1.7 times longer than wide; mesial margin with distal and subdistal spine, latter largest; distodorsal and distoventral spine. Propodus unarmed, palm 2.0–2.5 times as long as wide; mesial margin of palm longer than dactylus. Pollex and dactylus occlusal margins crenulated, apices with interlocking teeth; pollex occlusal margin with low tooth at midlength; dactylus occlusal margin with 2 or 3 proximal teeth. Epipod absent.

**Pereopods 2–4:** Slightly compressed; decreasing in length posteriorly; with scattered, setose striae. Merus elongate; length about 3.1–3.9 times width (pereopod 2) to 2.4–3.1 (pereopod 4); extensor margin with prominent upright spines (pereopods 2 and 3) or serrated (pereopod 4); distal extensor margin with large distal spine; flexor margin irregular to serrated but not spinose except for strong distal spine. Carpus with distal extensor spine and irregular or serrated margin (occasionally spinular on pereopods 2 and 3); with low, irregular, dorsal carina. Propodus extensor margin irregular, unarmed; flexor margin with movable spine at distal one-third to one-fourth and paired movable spines distally adjacent to dactylar articulation. Dactylus about two-thirds propodus length; extensor margin with scattered setae, unarmed; flexor margin with 9–11 low triangular teeth, each bearing corneous movable spine and more slender movable spine at base of corneous unguis. Epipods absent.

**Egg diameter:** 1.6–1.8 mm.

**Colour in life.** Carapace and abdomen off-white; lateral margins and ridges with pale orange-brown marks. Chelipeds deep orange-red. Walking legs off-white. Cornea pale pink. The holotype is depicted in colour by Poore *et al.* (2011, pl. 23F).

**Etymology.** Derived from the Latin *pyro*, fire and *chela*, alluding to the orange-red chelipeds of the new species.

**Remarks.** Most previous records of *M. serricornis* from southeastern Australia are based on *M. pyrochela* sp. nov. (see Baba & Poore, 2002; Ahyong & Poore, 2004). *Munidopsis pyrochela* is readily distinguished from *M. serricornis*, however, by the presence of epigastric spines on the carapace and the colour in life, in which the carapace and walking legs are whitish rather than orange. Of the *serricornis*-complex species, *M. pyrochela* sp. nov. most closely resembles those having a pair of epigastric spines and spinose extensor margins of the walking legs, namely

*M. spiridonovi* sp. nov., *M. mina* Benedict, 1902 from the eastern Pacific, and two western Atlantic species, *M. tridens* (A. Milne-Edwards, 1880) and *M. transtridens* Pequegnat & Pequegnat, 1971.

*Munidopsis pyrochela* differs from *M. transtridens* in the less slender cheliped carpus with a length less than twice the width (versus about 2.5–3 times width). From *M. mina*, *M. pyrochela* is readily distinguished by the presence of a prominent spine on the mesial margin of the carpus of the cheliped in addition to a small distal spine adjacent to the propodal articulation, rather than only a small distal spine. From *M. tridens*, *M. pyrochela* differs in having eight rather than seven telson plates, and three instead of two longitudinal rows of spines on the merus of the cheliped.

The presence of epigastric and lateral carapace spines is remarkably consistent in *M. pyrochela*, being present in all specimens including the smallest specimen examined (male, pcl 4.9 mm, NIWA 53274). The larger western Indian Ocean specimen (male, pcl 12.6 mm, OUMNH.ZC.2013-01-008) initially appeared to lack epigastric spines, but close inspection revealed that the spines were broken. Australian and New Zealand specimens usually have an irregular or serrated extensor carpal margin on the walking legs, but on pereopods 2 and 3, up to three of these serrations may be developed as spines, as in the two western Indian Ocean specimens. A specimen from The Snares (NIWA 19199) and a western Indian Ocean specimen (AM P92563) are the smallest ovigerous females at pcl 10.3 mm and pcl 10.2 mm, respectively.

The strongly disjunct distribution of *M. pyrochela*, between southern Australia and the western Indian Ocean, is conspicuous. The level of sampling from intermediate localities in the southern Indian Ocean, however, is presently inadequate to determine if the disjunction is real or artefactual. Material from both regions are similar, the two western Indian Ocean specimens being less setose dorsally than the Australian and New Zealand examples; the significance of these differences requires further study, especially given the apparent distributional disjunction. A similar disjunction applies also to the deep-water caridean shrimp, *Leontocaris bulga* Taylor & Poore, which is known from Tasmania and off southeast Africa (Komai & Chan, 2010).

*Munidopsis pyrochela* is a common seamount species and the most southerly occurring species of the *serricornis* complex, ranging into Subantarctic waters. The typical habitat of *M. pyrochela* remains to be confirmed, although the holotype was collected from a crevice in a hexactinellid glass sponge *Farrea similis* Reiswig & Kelly, and other specimens were collected together with various other species of hexactinellids. *Munidopsis pyrochela* has not yet been confirmed from deepwater corals, unlike *M. serricornis*, which is a known associate of the arborescent *Lophelia pertusa* in the northern Atlantic (Lavaleye *et al.*, 2009).

**Distribution.** Southwest Indian Ridge (Middle of What Seamount), New Zealand and south-eastern Australia, ranging in the east from the southern Kermadec Ridge and The Snares, south to the Macquarie Ridge and westwards to Tasmania including the South Tasman Rise and Cascade Plateau; 392–1414, usually 900–1000 m.

*Munidopsis spiridonovi* sp. nov.

Figs 7–9

**Type material.** HOLOTYPE: AM P92562, female (cl 18.2 mm, pcl 12.8 mm), Coco-de-Mer Ridge, 01°06.5'N 56°28.7'E, 1280–1380 m, Cruise 36, stn 3779, 1280–1380 m, RV *Akademik Kurchatov*, 4 May 1983. PARATYPE: ZMM, male (cl 18.8 mm, pcl 13.1 mm), collected with holotype.

**Other material examined.** —**Southeast Indian Ridge, Indian Ocean:** MNHN IU-2011-5083, 2 juvenile females (cl 8.2 mm, pcl 5.7 mm; cl 8.1 mm, pcl 5.7 mm), near Amsterdam Island, 37°47.20'S 77°38.98'E, 940–1680 m, JASUS CP7, MD50, 9 July 1986.

**Diagnosis.** Rostrum broad, flat, medially carinate, trifid distally. Carapace with pair of epigastric spines, otherwise unarmed dorsally; surface of dorsal half with granules and short rugae; lateral margins with 4 spines (1 anterolateral, 3 branchial); posterior orbital margin transverse; outer orbital spine distinct. Abdominal tergites unarmed. Telson with 8 plates. Maxilliped 3 merus flexor margin with 3 spines. Cheliped carpus length more than twice width, dorsal surface with row of spines; merus with 3 longitudinal rows of prominent spines (dorsal, mesial, ventromesial). Walking leg meri distinctly spinose along extensor margin; dactylus flexor margin lined with movable spines, distalmost at base of corneous unguis. Pereopods without epipods.

**Description of adults.** *Carapace:* Moderately convex from side to side; covered with short, fine setae; surface of anterior half with granules and short rugae; surface of posterior half with short rugae and distinct striae. Cervical groove indistinct. Pair of epigastric spines. Posterior orbital margins transverse to slightly oblique, outer orbital spine prominent. Frontal margins oblique, slightly concave; anterolateral spine similar to outer orbital spine. Lateral margins broadly convex; with 2 spines on anterior branchial margin and spine at junction of anterior and posterior branchial margins. Rostrum broad, 0.4 pcl; trifid distally; apex horizontal or slightly deflected dorsally; median carina distinct; lateral proximal margin convex. Posterior margin unarmed, medially emarginated. Pterygostomian flap with short diagonal striae; anterior margin blunt, angular.

*Sternum:* Sternite 3 about 0.3 width of sternite 4. Posterior margin of sternite 3 contiguous with anterior margin of sternite 4. Sternites smooth, sparsely setose, unarmed.

*Abdomen:* Tergites with short, fine, scattered setae, without spines. Tergites 2–4 with elevated anterior ridge; tergites 2 and 3 also with shallow groove behind anterior ridge. Tergites 4 and 5 with shallow, medially interrupted, transverse groove. Tergite 6 smooth; posterior margin not strongly produced. Telson composed of 8 plates (minute central plate present); lateral margin of midlateral plate lined with coarse, relatively stiff setae in males, distally setose in females. Uropodal endopod lateral margins setose, unarmed.

*Eye:* Ocular peduncle unarmed, sparsely setose; movable; partially concealed by rostrum. Cornea subglobular, slightly wider than peduncle. Small, slender spine adjacent to lateral margin of eye.

*Antennule:* Basal article squat, with 2 distolateral spines, dorsal shorter; distomesial margin with short triangular tooth.

*Antenna:* Basal article with triangular mesial and lateral tooth, neither overreaching article 2. Article 2 with strong distolateral spine, reaching midlength but not apex of article 3. Article 3 with distomesial spine. Article 4 unarmed. Flagellum slightly shorter than pcl.

*Maxilliped 3:* Dactylus, propodus and carpus unarmed. Merus extensor margin with 2 small, blunt to acute tubercles and distal spine; flexor margin with 2 large triangular spines proximally and 1 or 2 smaller spines distally. Ischium longer than wide, with distal flexor and extensor spine.

*Pereopod 1 (cheliped):* Cheliped elongate, 3.7 pcl (male paratype), 3.6 pcl (female holotype); with tufts of long, simple golden setae, most numerous on mesial and lateral margins; subcylindrical to ovate. Ischium with ventrodistal spine and dorsal spine. Merus with row of 8 or 9 strong, graded dorsal spines, largest distally; mesial margin with distal row of 3 or 4 mesial spines, largest distally at carpal articulation; ventromesial margin with longitudinal row of 3 strong spines proximally and distal spine. Carpus 2.1–2.3 times longer than wide; mesial margin with distal and subdistal spine, latter largest; distodorsal spine followed by longitudinal row of 1–5 (usually 3 or more) dorsal spines; distoventral spine. Propodus unarmed, palm 2.8–3.1 times as long as wide; mesial margin of palm about 1.5 times longer than dactylus. Pollex and dactylus occlusal margins crenulated, apices with interlocking teeth; pollex occlusal margin with proximal gape (more pronounced in male) and low tooth slightly distal to midlength; dactylus occlusal margin with proximal swelling, forming subquadrate tooth on male. Epipod absent.

*Pereopods 2–4:* Slightly compressed; decreasing in length posteriorly; with scattered, setose striae. Merus elongate; length 4.0–4.1 times width (pereopod 2) to 3.1 (pereopod 4); extensor margin lined with prominent upright spines, longest on pereopod 2, shortest on pereopod 4; distal extensor margin with large distal spine; flexor margin serrated, 1 or 2 occasionally forming short spine in addition to strong distal spine. Carpus with row of 4 or 5 extensor spines (pereopod 2), 1 or 2 extensor spines (pereopod 3), 1 distal extensor spine and serrated margin (pereopod 4); low, irregular, dorsal carina. Propodus extensor margin irregular, unarmed; flexor margin with movable spine at distal one-fourth and paired movable spines distally adjacent to dactylar articulation. Dactylus about 0.6 propodus length; extensor margin with scattered setae, unarmed; flexor margin with 10–12 low triangular teeth, each bearing corneous movable spine, distalmost movable spine at base of corneous unguis. Epipods absent.

*Egg diameter:* 1.3 mm.

**Colour in life.** Unknown.

**Etymology.** Named for Vassily Spiridonov, for kindly making material available for study and for his important contributions to decapod systematics.

Figure 7 [facing page]. *Munidopsis spiridonovi* sp. nov. A–L: female holotype, cl 18.2 mm, pcl 12.8 mm, (AM P92562); M–N, male paratype, cl 18.8 mm, pcl 13.1 mm (MMZ). (A) dorsal habitus; (B) carapace, right lateral view; (C) right antenna and antennule, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped finger tips, ventral view; (H) right cheliped ischiomerus and carpus, lateral view; (I) right ischiomerus and carpus, mesial view; (J) left cheliped carpus, dorsal view; (K) sternal plastron; (L) telson. Scale: A, B, G–J = 2.0 mm; C–F, K–L = 1.0 mm.

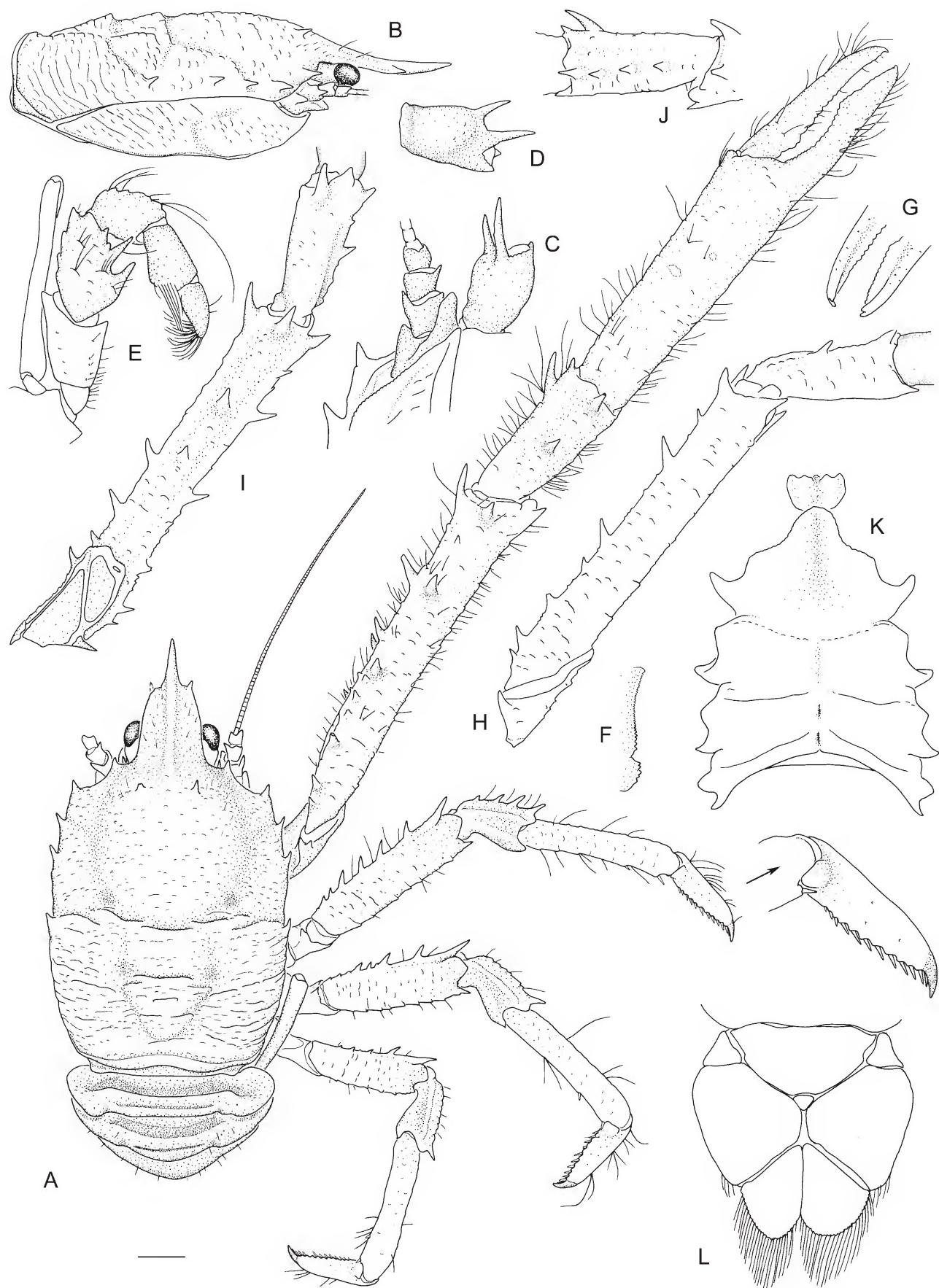


Figure 7. *Munidopsis spiridonovi* sp. nov. [caption on facing page, p. 210]

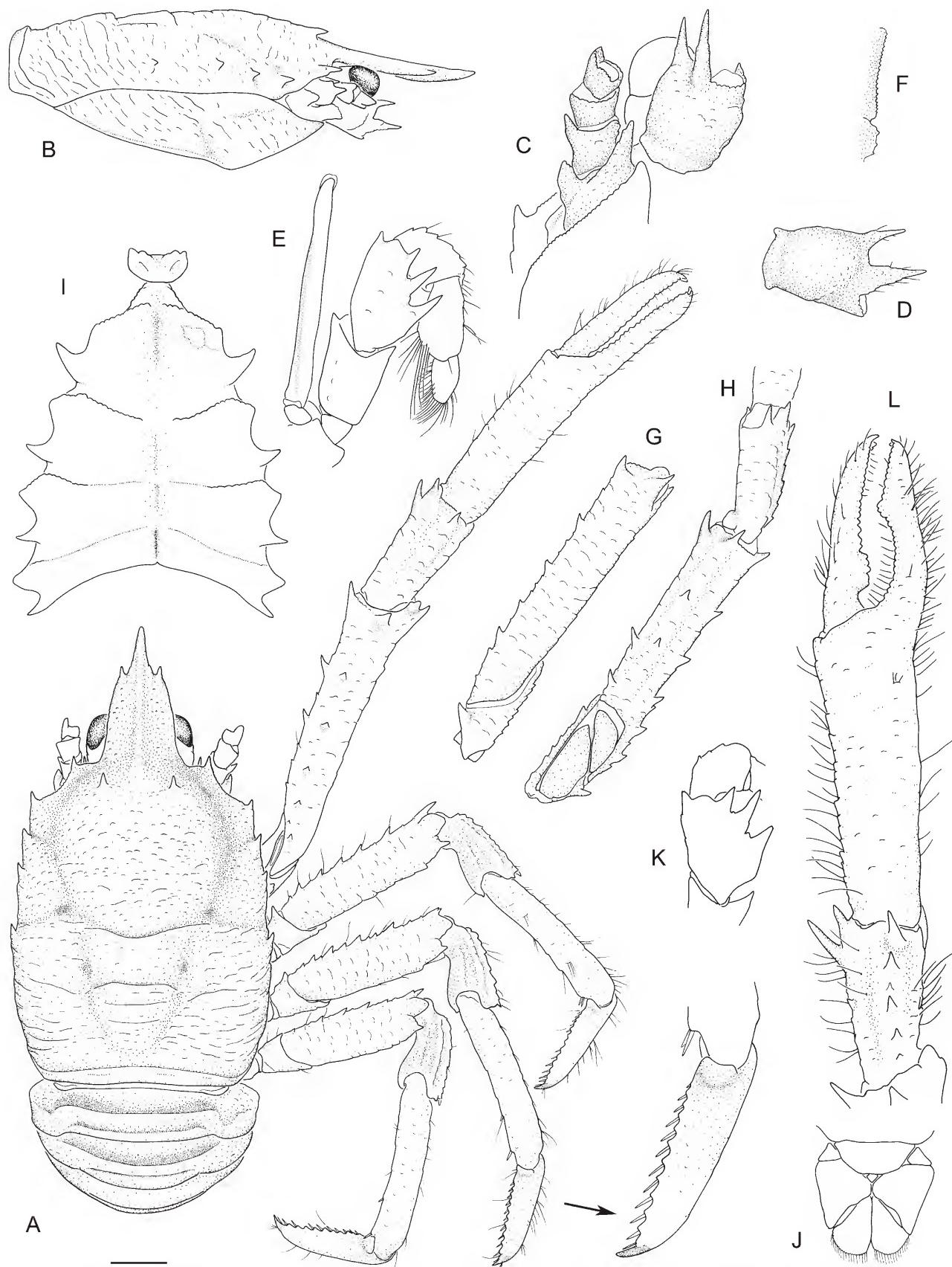


Figure 8. *Munidopsis spiridonovi* sp. nov. A–K: juvenile female, cl 8.2 mm, pcl 5.7 mm (MNHN IU-2011-5083). L–M, male paratype, cl 18.8 mm, pcl 13.1 mm (MMZ). (A) dorsal habitus; (B) carapace, right lateral view; (C) right antenna and antennule, ventral view; (D) right basal antennular article, lateral view; (E) right maxilliped 3; (F) right crista dentata; (G) right cheliped ischiomerus, lateral view; (H) right carpus and ischiomerus, mesial view; (I) sternal plastron; (J) telson; (K) right maxilliped 3 carpus and merus; (L) right cheliped carpus to dactylus. Scale: A, B, G, H, J = 1.0 mm; C–F, I = 0.5 mm; L–M = 2.3 mm.

**Remarks.** Among the *serricornis*-complex species, *Munidopsis spiridonovi* sp. nov. is closest to *M. pyrochela* sp. nov. and the western Atlantic *M. transtridens* in sharing a pair of epigastric spines, spinose extensor margins of the walking leg meri, and a prominent mesial spine on the cheliped carpus. Adult *M. spiridonovi* differs from *M. pyrochela* in having more elongate chelipeds, with the carpi armed with a row of dorsal spines, and carpal length more than twice width versus less than twice width. The cheliped length of adult *M. spiridonovi* exceeds 3.6 pcl whereas the chelipeds of *M. pyrochela* do not exceed 3.0 pcl. *Munidopsis spiridonovi* is very similar to *M. transtridens* in proportions and spination of the cheliped carpus (according to Mayo, 1974), but differs in having a markedly less setose carapace (sparse, short scarcely visible setae versus long prominent setae) and more elongate chelipeds in adults. The proportional length of the cheliped palm in adult *M. spiridonovi* is about 1.5 times dactyl length (versus 1.3 or less in *M. transtridens*), the cheliped merus is distinctly longer than pcl (almost as long as cl) rather than being about as long as pcl, and the cheliped length is greater than 3.6 pcl compared to about 3.0 pcl.

Variation between the male and female type specimens is slight, being most marked in the sexually dimorphic chelae in which the male cheliped fingers have a distinct versus slight gape (Fig. 7A, 8L). The carpus of the cheliped of the holotype has a dorsal row of two spines on the right side, four on the left (Fig. 8A, J). The male paratype has six dorsal carpal spines. The merus of maxilliped 3 is armed with three flexor spines, of which the distalmost ranges from smaller than to as large as the other two spines (Fig. 7E, 8K). The two juvenile females from the Southeast Indian Ridge (Fig. 8A–J), although lacking the row of carpal spines on the cheliped, are presently assigned to *M. spiridonovi*. They agree well with the adults in almost all features, but have a row of raised angular, dorsal prominences on the cheliped carpus rather than spines, an unarmed carpal extensor margin (excluding the distal spine) on pereopod 2, less prominent meral extensor spines on the walking legs, and a proportionally shorter cheliped in which the length is about 2.5 pcl with merus slightly shorter than pcl and palm about 1.2 times dactylus length. Although these juveniles potentially represent a different species in which diagnostic characters are yet to be fully expressed, each of the aforementioned differences between adults and juveniles are consistent with expected allometric changes in *M. spiridonovi*, and parallel changes in *M. transtridens*, which may also have a dorsal row of carpal spines on the cheliped in adults (Pequegnat & Pequegnat, 1971; Mayo, 1974; Tavares *et al.*, 2008).

**Distribution.** Western Indian Ocean from seamounts on the Coco-de-Mer Ridge and the Southeast Indian Ridge, near Amsterdam Island; 940–1680 m.

## Discussion

The discovery of six new *Munidopsis serricornis*-complex species documented here demonstrates the wide distribution of the group throughout the Indo-West Pacific. The majority of *serricornis*-complex species share a rostrum with typically convex margins, unarmed or spinose carapace margins, seven or eight (usually eight) telson plates, two or more prominent flexor spines on the maxilliped 3 merus, all pereopods without epipods, presence of a slender flexor spine or thick seta arising from the base of (and usually lying against) the unguis of pereopods 2–4. These include *M. serricornis* (Lovén, 1852), *M. crinita* Faxon, 1893, *M. mina* Benedict, 1902, *M. modesta* Benedict, 1902, *M. tridens* (A. Milne-Edwards, 1880), *M. transtridens* Pequegnat & Pequegnat, 1971, from the Atlanto-East Pacific, and *M. pyrochela* sp. nov., *M. alcocki* sp. nov., *M. spiridonovi* sp. nov., *M. ternaria* Macpherson, 2007, *M. comarge* Taylor, Ahyong & Andreakis, 2010, *M. macphersoni* sp. nov. and *M. atlantis* sp. nov., from the Indo-West Pacific. *Munidopsis treis* Ahyong & Poore, 2004 is superficially similar to *M. serricornis* on the basis of its trifid rostrum and unarmed dorsal surface but is excluded from the *serricornis* complex; it differs from all other *serricornis*-complex species in having the posterior orbital margins and frontal margins of the carapace in-line and sloping posteriorly at the same angle, as in *M. trifida* Henderson, 1885, and *M. kareenae* Ahyong, 2013.

Within the *serricornis* complex, three species (*M. acuminata* Benedict, 1902, *M. pubescens* Macpherson, 2007, and *M. nias* sp. nov.) differ from remaining species in the combination of a relatively short, broad, subquadrate rostrum, absence of epigastric spines, seven telson plates, cheliped with or without an epipod, one or two (usually one) flexor spines on the merus of maxilliped 3, proportionally short, squat pereopods with the pereopod 2 merus length not more than 2.5 times the width, in having two distal spines on the carpus of the walking legs, and absence of a slender flexor spine or thick seta arising from the base of the unguis of pereopods 2–4. *Munidopsis acuminata* Benedict, 1902, *M. pubescens* Macpherson, 2007, and *M. nias* sp. nov. form a discrete group within the *serricornis* complex suggesting common ancestry of the three species.

Present results demonstrate that *Munidopsis serricornis* is not cosmopolitan, but restricted to the Atlantic Ocean. All previous Indo-Pacific records of *M. serricornis* are referable to other species, most of which are newly described here: *M. alcocki* sp. nov., *M. pyrochela* sp. nov. and *M. nias* sp. nov. Other new species described herein have been discovered *de novo*: *M. atlantis* sp. nov., *M. macphersoni* sp. nov. and *M. spiridonovi* sp. nov.

Previous records of *M. serricornis* from the northern Indian Ocean (Alcock & Anderson, 1899a, b; Alcock, 1901) and off Madagascar (Macpherson, 2007) are based on *M. alcocki*. Records of *M. serricornis* (as *M. tridentata*) from the eastern Indian Ocean off Nias (Indonesia) reported by Doflein & Balss (1913) (later figured by Baba & Poore, 2002) are referable to *M. nias*. Laurie's (1926) record of *M. tridentata* from Saya de Malha is probably referable to *M. pubescens* Macpherson, 2007, described from Madagascar (see account of *M. nias*).

Records of *Munidopsis serricornis* (as *M. tridentata*) from the Philippines and south-eastern Indonesia by Baba (1988, 2005) are referable to *M. comarge* and *M.*

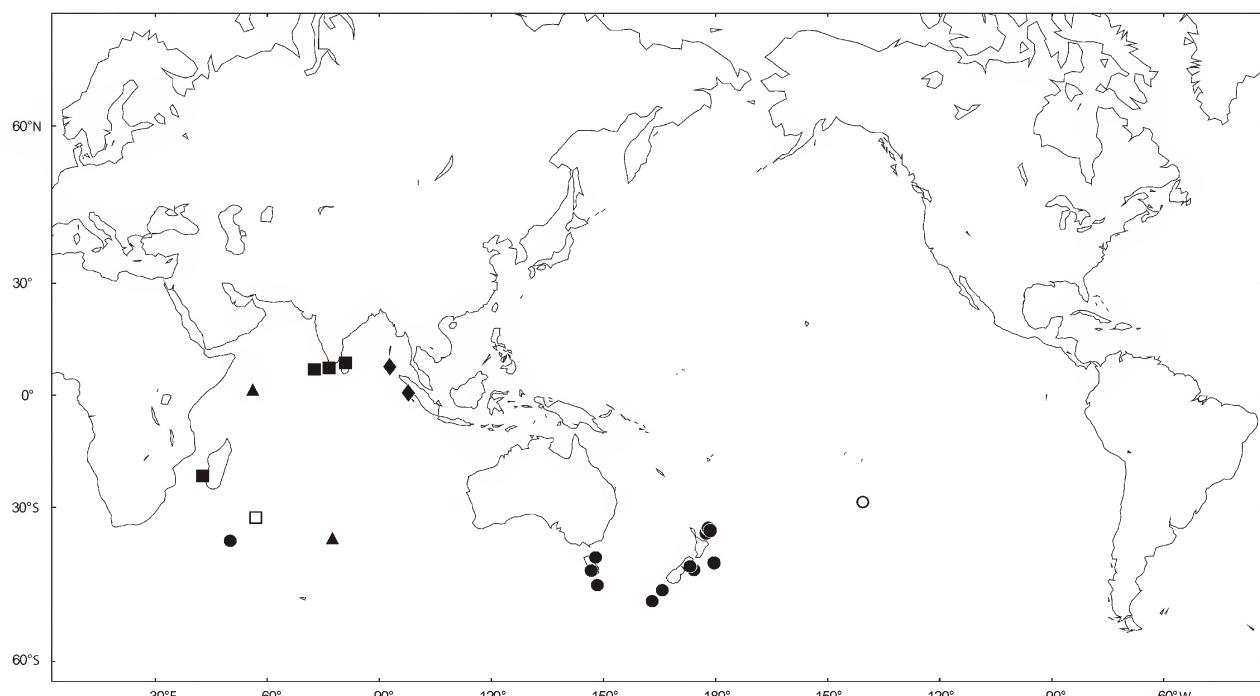


Figure 9. Known distribution of (■) *Munidopsis alcocki* sp. nov., (□) *M. atlantis* sp. nov., (○) *M. macphersoni* sp. nov., (♦) *M. nias* sp. nov., (●) *M. pyrochela* sp. nov., (▲) *M. spiridonovi* sp. nov.

*ternaria*, respectively (USNM specimens re-examined in 2013). Similarly, the New Zealand records of *M. comarge* (Taylor *et al.*, 2011) are here referred to *M. ternaria* (NIWA specimens re-examined in 2013). Thus, *M. comarge* ranges from southern and western Australia to the Philippines and Taiwan, and *M. ternaria* ranges from New Zealand to New Caledonia and southeastern Indonesia (Osawa *et*

*al.*, 2008; Baba *et al.*, 2009; Lin & Chan, 2011). Previous records of *M. serricornis* from Pacific-Asian localities are all based on *M. comarge* and *M. ternaria*. Previous records of *M. serricornis* from Australia are based on *M. treis*, *M. comarge* and *M. pyrochela*. The updated identity of previous records of *M. serricornis* and its synonyms from the Indo-West Pacific is given in Table 1.

**Table 1.** Identity of previous Indo-West Pacific records of *Munidopsis serricornis* and its synonyms (*M. rosacea* and *M. tridentata*).

Reference	Locality	Reported name	Current name
Alcock & Anderson (1899a,b)	Laccadive Sea	<i>M. ?rosacea</i> <i>M. rosacea</i>	<i>M. alcocki</i>
Alcock (1901)	Bay of Bengal; Laccadive Sea; Maldives	<i>M. tridentata</i>	<i>M. alcocki</i>
Doflein & Balss (1913)	Nias, Indonesia	<i>M. tridentata</i>	<i>M. nias</i>
Doflein & Balss (1913)	Off Somalia	<i>M. tridentata</i>	<i>M. pubescens</i>
Laurie (1926)	Saya de Malha Bank	<i>M. tridentata</i>	<i>M. pubescens</i>
Baba (1988)	Obi, Indonesia	<i>M. tridentata</i>	<i>M. ternaria</i>
Baba (1988); Komai (2000)	Sulu Sea, Philippines	<i>M. tridentata</i>	<i>M. comarge</i>
Baba & Poore (2002)	South-eastern Australia	<i>M. serricornis</i>	<i>M. pyrochela</i> <i>M. comarge</i> <i>M. treis</i>
Baba & Poore (2002)	Nias, Indonesia	<i>M. serricornis</i>	<i>M. nias</i>
Ahyong & Poore (2004); Poore (2004)	South-eastern Australia	<i>M. serricornis</i>	<i>M. pyrochela</i>
Baba (2005)	Mindanao Sea, Philippines	<i>M. serricornis</i>	<i>M. comarge</i>
Macpherson (2007)	Madagascar	<i>M. serricornis</i>	<i>M. alcocki</i>
Poore <i>et al.</i> (2008)	Western Australia	<i>M. serricornis</i>	<i>M. comarge</i>
Baba <i>et al.</i> (2009)	Taiwan	<i>M. serricornis</i>	<i>M. comarge</i>
Webber <i>et al.</i> (2010); Rowden <i>et al.</i> (2011)	New Zealand	<i>M. cf. serricornis</i>	<i>M. pyrochela</i>
Yaldwyn & Webber (2011)	New Zealand	<i>M. serricornis</i>	<i>M. pyrochela</i>

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